UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

DEC 21, 2000

Reply To
Attn Of: OAQ-107

Mr. Andrew Ginsburg
Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390

Dear Mr. Ginsburg:

In light of EPA' s continuing investigation of the wood products industry, the Oregon Department of Environmental Quality (ODEQ) has asked that EPA Region 10 respond to three questions regarding volatile organic compounds as they relate to Oregon's air program implementation. The questions are:

(1) How is the mass of volatile organic compounds (VOCs) to be calculated for major source and major modification determinations?
(2) What are EPA's expectations of ODEQ's regulation and permitting programs for sources in the wood products industry with respect to VOC emissions?
(3) How would a source in the wood products industry measure VOC emissions?

Enclosed with this letter is our response to the questions raised by your staff.

We will continue to work with ODEQ staff as EPA continues its investigation of the wood products industry. If there are any questions regarding this letter, please contact Kory Tonouchi of my staff at (206) 553-6908.

Sincerely,

Barbara McAllister, Director
Office of Air Quality

Enclosure

cc: John Ruscigno, ODEQ-Salem
Robert Koster, LRAPA
Richard Biondi, EPA-OECA/AED
Paul Koprowski, EPA-OOO/A
Jeff Kopf, ORC

Attachment 1

(1) How is the mass of volatile organic compounds (VOCs) to be calculated for major source and major modification determinations?

The Clean Air Act and EPA regulations define "major source" and "major modification" in terms of emitting "tons per year" of any regulated air pollutant. As such, the total mass of each regulated air pollutant must be calculated in order to determine if a particular source or modification is "major." VOCs are a class of air pollutants regulated under a variety of SIP emission limits and new source performance standards as a precursor to ozone. More importantly, VOCs are specifically regulated as a class of ozone precursors for major source purposes (e.g., see 40C.F.R. § 51.165, § 51.166, § 70.2, etc.).

40 C.F.R. § 51.100(s) defines VOC as "any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions." A number of compounds are deemed to have "negligible photochemical reactivity," and are therefore exempt from the definition of VOC. The Federal definition of VOC does not specify how to measure the mass of the organic compound being emitted to the air.

It appears that the confusion over how the mass of VOCs should be calculated for major source and major modification determinations stems from the test methods used for determining compliance with performance standards for organic compounds in 40 C.F.R. Part 60, Appendix A. Some of the test methods account for the carbon in VOCs (i.e., EP A Methods 25 and 25A), while others measure emissions of specific organic compounds directly (i.e., EPA Methods 18, 0010, and 0030).

For the purpose of major source or major modification determinations (and similarly for Title V applicability), emissions must be calculated as the *total mass of VOCs* (an "as VOC" basis). Expressing VOC emissions in any other way (e.g., as carbon) may underestimate the quantity of VOCs being emitted and thereby result in erroneous major source/modification determinations.

However, for the purposes of determining compliance with source category specific *emission limits* or *performance standards,* VOCs may be expressed according to the test methods in the approved State Implementation Plan or 40 C.F.R. Part 60, Appendix A, as specified in the particular rule or regulation. This can be on a carbon, propane calibration gas, or compound specific basis.

(2) What are EPA's expectations of Oregon Department of Environmental Quality's regulation and permitting program for sources in the wood products industry with respect to VOC emissions?

ODEQ has asked how it should incorporate the information obtained as a result of EPA's national wood products initiative with respect to wood products facilities in Oregon. ODEQ was particularly concerned with issues related to Plant Site Emission Limits (PSELs), baseline emission rates, and the evaluation of major source and major modifications for new source review applicability when evaluating VOC emissions. In general, EPA expects ODEQ to evaluate companies that emit VOCs in the production ofwood products based on EPA's findings in the national wood products investigation of Louisiana-Pacific, Georgia-Pacific, Weyerhaeuser, and Willamette Industries. Additionally, ODEQ may want to investigate the accuracy of emissions data from other sources of VOCs, other than the wood products industry, where the methodology of emissions calculations could be questioned.

Under the current NSR rules, PSELs are used for certain elements of the program (e.g., offsets). Under ODEQ's proposed changes to the air quality regulations, we understand that PSELs will also serve as an emission limit on a facilities' potential-to-emit (PTE). Sources relying on PSELs to avoid classification as a major source must have their emissions accurately expressed. In the case of VOCs, PSELs must be quantified by the total mass of VOCs (an "as VOC" basis).

As mentioned previously, with respect to major source and major modification determinations, VOC emissions are to be expressed and evaluated as the total mass of VOCs (an "as VOC" basis). Total mass of VOCs must also be used for calculating baseline emission rates since they are used in major modification determinations.

(3) How would a source in the wood products industry measure VOC emissions?

The majority of VOC testing by regulated entities is conducted using one of three EPA Reference Methods: Methods 18, 25, or 25A. Each Method has technical limitations and will have a different degree of accuracy depending upon its application. Source specific modifications to the Reference Methods, as approved by EPA, can be made so that accurate and representative measurements are obtained. It should be noted that the measurements using these methods cannot be directly compared unless additional calibration procedures or assumptions and calculations are made.

EPA Method 18 identifies only those compounds for which sampling and analysis is specifically conducted. Method 18 is generally used to quantify emissions from well characterized sources for compounds which sampling and analysis is specifically conducted. Method 18 does not identify or quantify unknown compounds. For sources with complex and/or variable organic emissions, Method 18 is generally used to identify and/or measure as many

compounds as possible in order to calculate actual VOC emissions from other measurements (e.g., EPA Method 25or 25A). The results from Method 18 should be reported as the total mass of VOCs (an "as VOC" basis).

EPA Method 25 does not provide results on an organic compound specific basis. Method 25 measures total gaseous non-methane organic compounds and expresses the results on an "as carbon" basis. To convert the results to a VOC mass flow rate, it is necessary to know the VOC-to-carbon weight ratio for the mixture of organic compounds in the gas stream tested.

Like Method 25, Method 25A does not provide results on an organic compound specific basis. Method 25A measures total hydrocarbon concentrations with results expressed in terms of the calibration standard (e.g., ppm as propane). Converting Method 25A results to a mass emission rate is similar to Method 25 except that the relative response factor between the organic compounds in the gas stream and the gas used to calibrate the Method 25A analyzer must be taken into account.

As mentioned above, for sources with complex or variable organic emissions streams, converting theresults of Methods 25 and 25A to a mass emission rate can be difficult. When compound data is not available, sources can (1) use Method 18 to identify as many compounds as possible; (2) use a representative average VOC-to-carbon ratio if the individual ratios are similar enough; or (3) use a worst case VOC-to-carbon ratio (to show emissions below a rule applicability threshold).

The wood products industry has long used Methods 25 and 25A for measuring VOCs. Below is a discussion of a few issues related to the use of Methods 25 and 25A by the wood products industry.

Sources with significant aldehyde and ketone emissions have used EPA Method 0011 to quantify those emissions. The National Council of the Paper Industry for Air and Stream Improvement (NCASI) chilled impinger method has been used by sources for measuring formaldehyde and methanol emissions (NCASI Method CI/WP-98.01). The results of Method 0011, or the chilled impinger method, in combination with the results of Method 25 and 25A converted to "as VOC" have yielded results consistent with NCASI studies from 1984 to the present, and with testing conducted by wood products sources under the requirements of Consent Decrees stemming from EPA enforcement actions.

Information gathered by NCASI has shown that for dryers drying predominately pine species, the formaldehyde and methanol emissions are generally low (there are exceptions). The VOC is predominately terpenes with mass-to-carbon ratios of 1.13.

For wood dryers drying non-pine species, the emissions are known to vary widely with a potential to be significant. It would be necessary to identify the major organic compound basis so that a mass-to-carbon ratio can be developed (e.g., NCASI technical bulletin No. 718, page 13,

reports acetic acid as the major VOC emitted when drying cedar lumber). These types of sources should be characterized at least once to verify if formaldehyde and methanol emissions are low. If formaldehyde and methanol emissions are high or variable, sources will find it necessary to measure them concurrently each time a method is run to measure VOC emissions.

For panelboard press vents, it would be necessary to measure methanol and formaldehyde emissions separately, and assume that the remaining detected organic carbon to be terpenes. The resulting terpene, methanol, and formaldehyde mass emissions must then be summed to yield VOC mass emissions.

If sources have significant amounts of methane, ethane, or acetone (exempt VOCs), it will be necessary to measure their concentrations using Method 18, and to develop Method 25A analyzer response factors for them at the measured concentrations and stack gas conditions. The Method 25A analyzer signal must then be corrected by subtracting the methane, ethane, and acetone contributions. If Method 25 is used, the concentration of exempt VOC expressed as a carbon must be subtracted from the total Method 25 measured concentration of VOC as carbon.

EPA Methods 18, 25, and 25A are acceptable methods for measuring VOC emissions from the wood products industry. While each method has limitations in its application and accuracy, acceptable results can be obtained if used properly. For more information regarding these methods, you can refer to the EPA "Manual for the coordination of VOC emissions testing using EPA Methods 18, 21, 25, and 25A" (EPA 340/1-91-008). For detailed descriptions of wood products source specific modifications to Method 25, you can refer to NCASI technical bulletins No. 405 and 455, and the paper entitled "Elimination of interference from carbon dioxide when sampling high-moisture/high-C02 gases for VOC using Method 25" by C.G. Simon and C.P. Sneeringer, in Proceedings, *Measurement of Toxic and Related Air Pollutants,* VIP-74, Vol.2, pp. 904-916 (1997). For wood products source specific modifications to Method 25A, refer to the NCASI paper entitled "Preliminary results from laboratory and field studies of total hydrocarbon (VOC) analyzers and discussion of the application of Method 25A measurement systems to wood products sources."